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Impact of frontal ablation on estimates of ice mass stored in glaciers of Alaska

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Estimates of the ice thickness distribution are necessary as initial conditions for glacier models and important for quantifying the potential contribution of glaciers to sea-level change. A wide range of methods base their estimates on glacier surface properties and use mass conservation to constrain mass fluxes through given glacier cross-sections. The results are thus sensitive to the spatial distribution of the mass flux. For lake- and marine-terminating glaciers, the surface mass budget cannot be considered balanced, even assuming equilibrium between glacier and climate. The derived ice thickness estimate for these glaciers hence depends on estimates of frontal ablation. Using the ice-thickness estimation module of the Open Global Glacier Model (OGGM), we determine the impact of accounting for frontal ablation on the estimate of ice mass stored in Alaskan glaciers.
We implement a simple parametrization of calving in OGGM. Frontal ablation is computed as function of the height, width and estimated water depth of the calving front.